CLAIMS

1. A method of measuring a change in pressure inside an engine cylinder during combustion, said method comprising the steps of:

affixing at least one thick film resistor to a metal shell of a spark plug that provides combustion ignition to the engine cylinder;

applying a voltage to said at least one thick film resistor; and

monitoring a change in resistance of said at least one thick film resistor in response to change in strain of the spark plug to determine change in pressure during combustion inside the engine cylinder.

2. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 1, further comprising the step of:

orienting said at least one thick film resistor such that it measures axial strain of the spark plug.

3. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 1, further comprising the step of:

orienting said at least one thick film resistor such that it measures hoop strain of the spark plug.

4. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 1, further comprising the step of:

including said at least one thick film resistor in a wheatstone bridge circuit.

5. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 4, wherein said step of including comprises including said at least one thick film resistor in a selected one of a quarter wheatstone bridge circuit, a half wheatstone bridge circuit and a full wheatstone bridge circuit.

6. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 1, further comprising the step of:

amplifying the change in resistance of said at least one thick film resistor with an automatic drift compensating circuit.

7. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 1, further comprising the step of:

forming said at least one thick film resistor by printing the at least one thick film resistor onto the metal shell of the spark plug.

8. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 7, where said step of forming comprises:

printing two dielectric layers on the metal shell;

printing a conductor layer upon an outer one of the dielectric layers; and

printing a piezoelectric ink upon the conductive layer.

9. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 1, further comprising the step of:

forming said at least one thick film resistor on a decal; and affixing said decal onto the metal shell of the spark plug.

10 The method of measuring a change in pressure inside an engine cylinder during combustion of claim 4, further comprising the step of:

amplifying the change in resistance of said at least one thick film resistor with an automatic drift compensating circuit.

11. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 10, wherein said step of amplifying comprises:

comparing the voltage from each side of said wheatstone bridge circuit to produce a first voltage output;

inputting said first voltage output into a first amplifier, said first amplifier producing a second voltage output;

balancing said first voltage output with said second voltage output;

inputting said first voltage output and said second voltage output into a second amplifier; and

adjusting the output of said second amplifier to a predetermined level when pressure in side the engine cylinder is equal to zero.

12. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 10, wherein said step of amplifying comprises:

comparing the voltage from each side of said wheatstone bridge circuit to produce a first voltage output and a second voltage output;

inputting said first and second voltages into an amplifier, said first amplifier producing a third voltage output;

balancing said first voltage output with said second voltage output; and

adjusting the output of said amplifier to a predetermined level when pressure in side the engine cylinder is equal to zero.

13. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 10, further comprising the step of:

forming said at least one thick film resistor by printing the at least one thick film resistor onto the metal shell of the spark plug.

14. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 13, further comprising the step of:

orienting said at least one thick film resistor, said orientation being selected for measuring at least one of axial strain of the spark plug and hoop strain of the spark plug.

15. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 14, wherein said step of including comprises including said at least one thick film resistor in a selected one of a quarter wheatstone bridge circuit, a half wheatstone bridge circuit and a full wheatstone bridge circuit.

16. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 15, where said step of forming comprises:

printing two dielectric layers on the metal shell;

printing a conductor layer upon an outer one of the dielectric layers; and

printing a piezoelectric ink upon the conductive layer.

17. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 16, wherein said step of amplifying comprises:

comparing the voltage from each side of said wheatstone bridge circuit to produce a first voltage output;

inputting said first voltage output into a first amplifier, said first amplifier producing a second voltage output;

balancing said first voltage output with said second voltage output;

inputting said first voltage output and said second voltage output into a second amplifier; and

adjusting the output of said second amplifier to a predetermined level when pressure in side the engine cylinder is equal to zero.

18. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 16, wherein said step of amplifying comprises:

comparing the voltage from each side of said wheatstone bridge circuit to produce a first voltage output and a second voltage output;

inputting said first and second voltages into an amplifier, said first amplifier producing a third voltage output;

balancing said first voltage output with said second voltage output; and

adjusting the output of said amplifier to a predetermined level when pressure in side the engine cylinder is equal to zero.

19 The method of measuring a change in pressure inside an engine cylinder during combustion of claim 10, further comprising the step of:

forming said at least one thick film resistor on a decal; and

affixing said decal onto the metal shell of the spark plug.

20. The method of measuring a change in pressure inside an engine cylinder during combustion of claim 19, further comprising the step of:

orienting said at least one thick film resistor, said orientation being selected for measuring at least one of axial strain of the spark plug and hoop strain of the spark plug.

21. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 20, wherein said step of including comprises including said at least one thick film resistor in a selected one of a quarter wheatstone bridge circuit, a half wheatstone bridge circuit and a full wheatstone bridge circuit.

22. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 21, wherein said step of amplifying comprises:

comparing the voltage from each side of said wheatstone bridge circuit to produce a first voltage output;

inputting said first voltage output into a first amplifier, said first amplifier producing a second voltage output;

balancing said first voltage output with said second voltage output;

inputting said first voltage output and said second voltage output into a second amplifier; and

adjusting the output of said second amplifier to a predetermined level when pressure in side the engine cylinder is equal to zero.

23. The method of measuring a change in pressure inside an engine cylinder during combustion of Claim 21, wherein said step of amplifying comprises:

comparing the voltage from each side of said wheatstone bridge circuit to produce a first voltage output and a second voltage output;

inputting said first and second voltages into an amplifier, said first amplifier producing a third voltage output;

balancing said first voltage output with said second voltage output; and

adjusting the output of said amplifier to a predetermined level when pressure in side the engine cylinder is equal to zero.